Ordering number: EN 1343D

Monolithic Linear IC

No.1343D

SANYO

LA2010

Audio Level Sensor

The LA2010 is an IC for detecting interprogram spaces to pick out the starting point of a program immediately preceding or following a musical program recorded on tape.

Applicable Sets
- Radio-cassette recorders
- Cassette decks
- Car stereos

Application
- Detection of spaces between programs recorded on tape

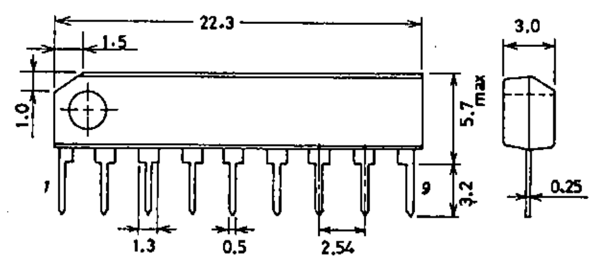
Features
- Built-in transistor capable of driving plunger with 600 mA max. and protective diode to prevent induced reverse voltage
- Capable of desired timing setting by using external C, R
- Detects unrecorded areas of tape and drives plunger.
- Built-in preventer to prevent plunger from malfunctioning at the time of application of power
- Built-in detector to detect recorded area

Maximum Ratings/T_a = 25°C			unit
Maximum supply voltage	V_{CC} max	15	V
Flow-in current	I_6 max	600	mA
Allowable power dissipation	P_d max	540	mW
Operating temperature	Topr	−20 ~ +75	°C
Storage temperature	T_{stg}	−40 ~ +125	°C

Note)
- The voltage on pin 1 must not exceed the voltage on pin 9.
- The current flowing into pin 2 and pin 4 must not exceed ±0.5 mA continuously.
- The voltage on pin 8 is 2.5 V max. and must not exceed the voltage on pin 7.

Operating Conditions/T_a = 25°C			unit
Recommended supply voltage	V_{CC}	9	V
Operating voltage range	V_{CC} op	3.5 ~ 14	V

Package Dimensions 3017B-S9IC
(unit: mm)



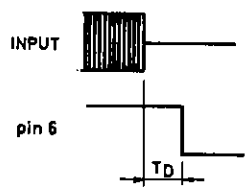
Operating Characteristics/T_a = 25°C, V_{CC} = 9.0 V, f = 1 kHz

			min	typ	max	unit
Circuit current	I_{CC}	f = 1 kHz, V_{IN} = – 30 dB		11	22	mA
Output transistor saturation voltage	V_{CE} (sat)	I_6 = 600 mA		1.1	1.6	V
Output diode forward voltage	V_F	I_F = 600 mA		1.5	2.0	V
Input check level	V_{IN}	f = 1 kHz, Pin 6 L → H	–47	–50	–53	dB
Comparator (1) ON level	$V_{TH1\text{-}H}$	Pin 6 inverted	3.0	3.5	4.0	V
Comparator (1) OFF level	$V_{TH1\text{-}L}$	Pin 6 inverted	1.8	2.2	2.6	V
Comparator (2) ON level	$V_{TH2\text{-}H}$	Pin 6 inverted	4.7	5.5	6.3	V
Comparator (2) OFF level	$V_{TH2\text{-}L}$	Pin 6 inverted	3.6	4.0	4.6	V
Pin 4 reset level	V_{4R}	f = 1 kHz, V_{IN} = –30 dB, pin 8 = 1.0 V		0.02	0.1	V
Pin 8 reset voltage-1	$V_{8R\text{-}1}$	Pin 1 inverted, Rg = 0	0.6	0.7	0.8	V
Pin 8 reset volgate-2	$V_{8R\text{-}2}$	f = 1 kHz, V_{IN} = –30 dB, pin 4 inverted	1.1	1.3	1.5	V

1. Description of external parts

- C1: Input coupling capacitor
  Capacitor used for coupling with preceding preamp. Characteristics at the time of application of power considered, the capacitance value of C1 must not exceed that of C3 on pin 3. 0.047 μF (polyester film capacitor) is recommended. R1, R2 are used to adjust the input level. Pin 1 is high in input imedance; in order to be free from external effect, R2 must not exceed 10 kohm and must be grounded.

- C2, R3: For setting interprogram space detect time (TD)
  By selecting proper C2 and R3, your desired TD can be obtained.
  TD = 1.34 x C2 · R3 (sec)
  It is recommended to use R3 of 150 kohm to 500 kohm.
  It is recommended to use C2 of 0.22 μF (polyester film capacitor).



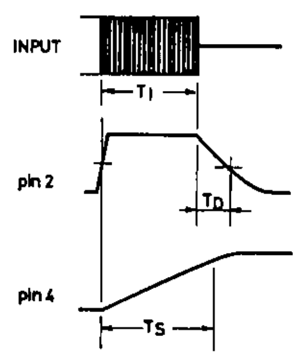
- C3: NF capacitor
  Lower cut-off frequency fL depends on this capacitor.

$$fL = \frac{1}{0.3\pi C3\ (\mu F)} \cdots\cdots\cdots\cdots\ (kHz)$$

  Assuming C3 = 0.47 μF, fL = 2.2 kHz is obtained. If the capacitance value of C3 is increased, fL lowers, thereby being subjected to the effect of the variations in preamp. Further, since the time that elapses between the moment V_{CC} is applied and the moment the circuit is stabilized becomes longer, the reset time must be made longer accordingly. Therefore, it is recommended to use C3 of 0.47 μF.

- C4, R4: For setting recorded area detect time (TS)
  The presence or absence of a program (input signal) is checked by the time setting determined by C4, R4 as follows:
  - For recorded area $T_S < T_I + T_D$
  - For unrecorded area $T_S > T_I + T_D$

  The recorded area detect time is set by:
  T_S = C4 (μF) R4 (kΩ) (msec)
  Therefore, if the recorded area detect time (TS) is longer than the input signal time (TI) + the unrecorded area detect time (TD), no program is present. The resistance value of R4 must be 50 kohm to 200 kohm; it is recommended to use R4 of 100 kohm. The capacitance value of C4 must not exceed 4.7 μF; it is recommended to use C4 of 1 μF to 3.3 μF.

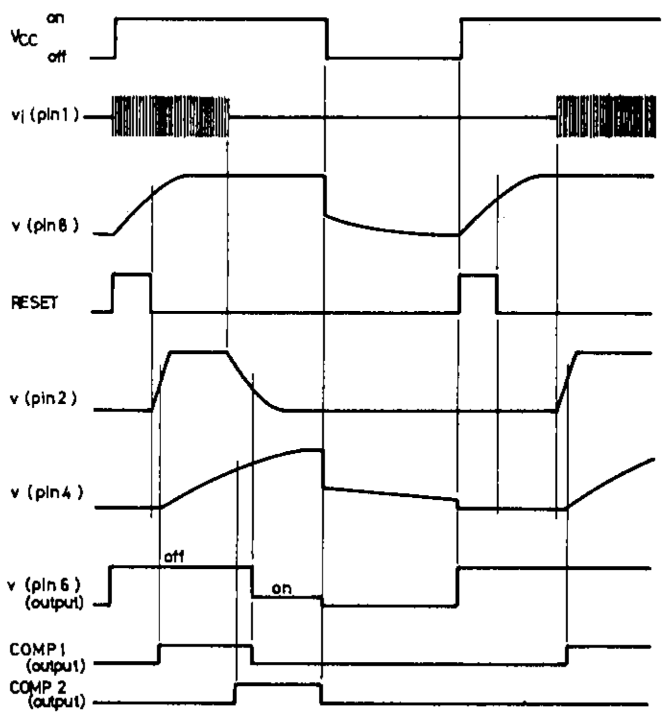


- C5: For setting reset time
  Capacitor used to set the time for initializing the circuit at the time of application of power. The reset pulse is generated for a certain period of time [TR = 14.4 · C5 (μF) (ms)] that is set each time power is applied.
- C6, R5: For power ripple filter

Description of Operation (See Timing Chart.)

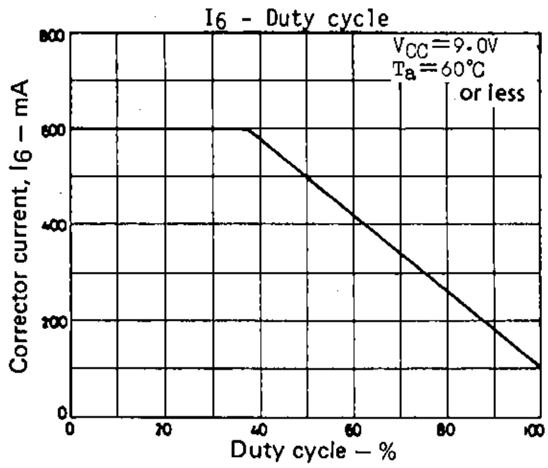
When power is applied, the reset circuit operates to initialize the circuit. The reset time depends on the capacitance value of C5 on pin 8 and no input signal is accepted while the reset circuit is operating. When the reset mode is released and the input signal exceeds the input check level, C, R on pin 2 are charged and the potential on pin 2 rises, thereby causing the comparator (1) to be inverted. When the comparator (1) is inverted, pin 4 (C4) is charged and the potential on pin 4 begins rising. When this potential exceeds the threshold voltage, the comparator (2) is inverted and the program presence mode is memorized; thus the potential on pin 4 is held at High level. During this period of time, the output (pin 6) is held at High level. When the signal disappears and the comparator (1) is inverted, the output (pin 6) turns to Low level, thereby causing the plunger to be driven.
The reset pulse is generated for a certain period of time each time power is applied, thereby causing the circuit to be initialized.

Timing Chart

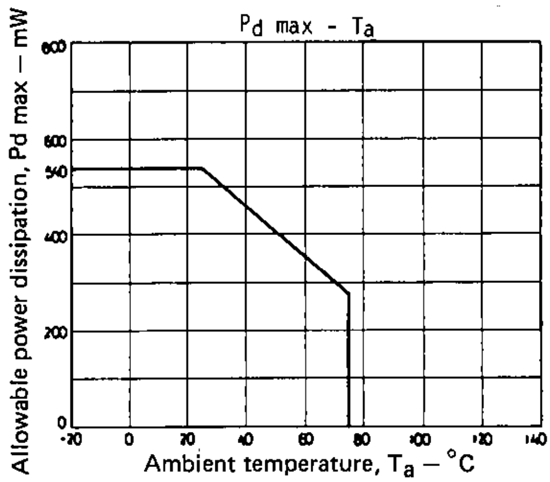


Proper Cares in Using IC

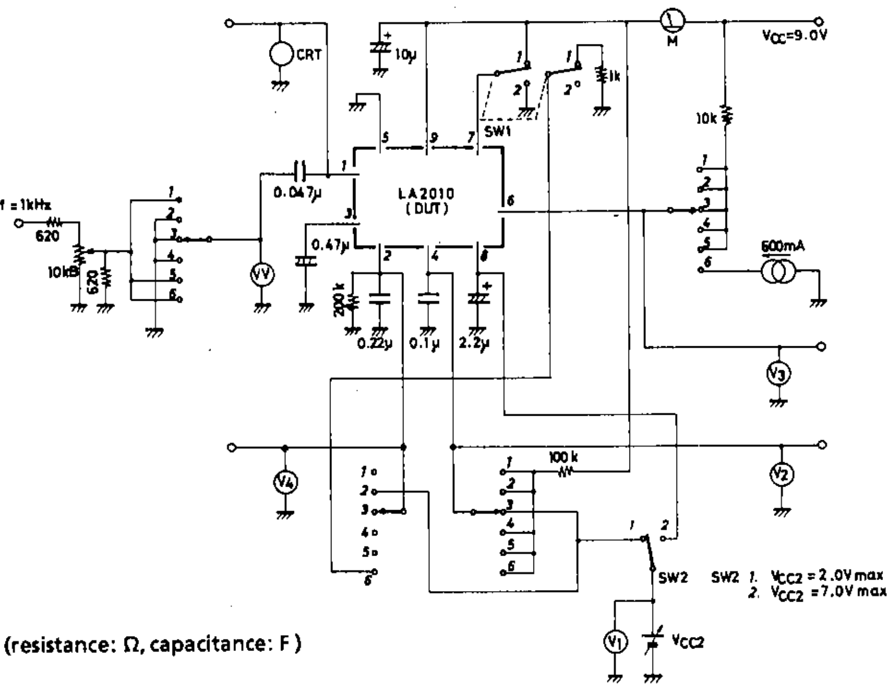
- Maximum Ratings
  If the maximum ratings are exceeded, breakdown or deterioration may result. Use the IC in the range where the maximum ratings are not exceeded.
- Pin-to-pin Short and Inverted Insertion
  These may cause breakdown or deterioration to occur. Be extremely careful when mounting the IC on the board.
- The voltage on pin 1 must not exceed that on pin 9.
- The current flowing into pin 2 and pin 4 must not exceed ±0.5 mA continuously.
- The voltage on pin 8 is 2.5 V max. and must not exceed that on pin 7.
- Electrolytic capacitors are used to set the recorded area detect time and reset time. The actual time constants are 15 to 20 % larger than the calculated values obtained by using the catalog values of such capacitors. For polyester film capacitor and tantalum electrolytic capacitor, the calculated values hold to a fairly good approximation.



Note) Continuous application of
I_C = 600 mA: Within 3 sec.



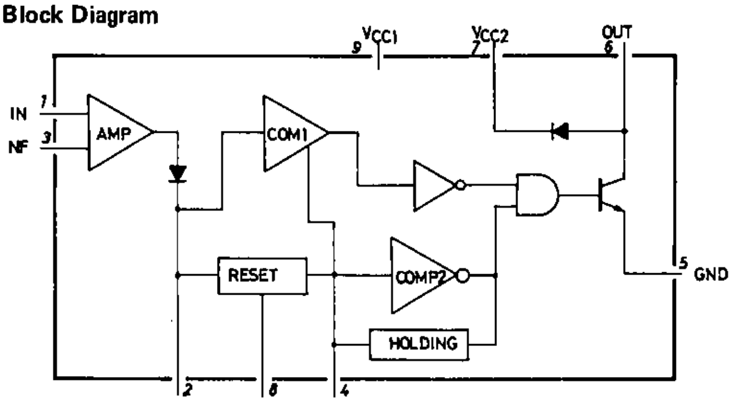
Test Circuit



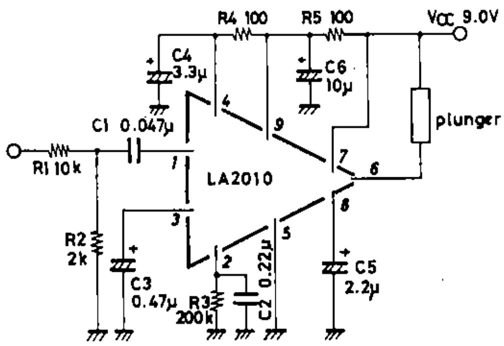
Unit (resistance: Ω, capacitance: F)

Test Item	Symbol	Rotary SW	SW-1	SW-2	Conditions
Input check level	V_{IN}	1	1	1	Measure AC input level VV at pin 6 L → H inversion mode.
Comparator (1) ON level	$V_{TH1\text{-}H}$	2	1	1	Measure pin 2 V_4 at pin 6 L → H inversion mode.
Comparator (1) OFF level	$V_{TH\text{-}1\text{-}L}$	2	1	1	Measure pin 2 V_4 at pin 6 H → L inversion mode.
Comparator (2) ON level	$V_{TH\text{-}2\text{-}H}$	3	1	1	Measure pin 4 V_2 at pin 6 H → L inversion mode.
Comparator (2) OFF level	$V_{TH\text{-}2\text{-}L}$	3	1	1	Measure p-n 4 V_2 at pin 6 L → H inversion mode.
Pin 8 reset voltage 1	$V_{8R\text{-}1}$	4	1	2	Measure V_1 voltage at pin 1 inversion mode.
Pin 8 reset voltage 2	$V_{8R\text{-}2}$	5	1	2	Measure V_1 voltage at pin 4 inversion mode.
Pin 4 reset level	V_{4R}	5	1	2	Measure pin 4 voltage V_2 at V_1 = 1V.
Circuit current	I_{CC}	5	1	1	Measure supply current.
Output transistor saturation voltage	$V_{CE\ (sat)}$	6	1	1	Measure pin 6 voltage V_3 at 600 mA.
Output diode saturation voltage	V_F	6	2	1	Measure pin 6 voltage V_3 at 600 mA.

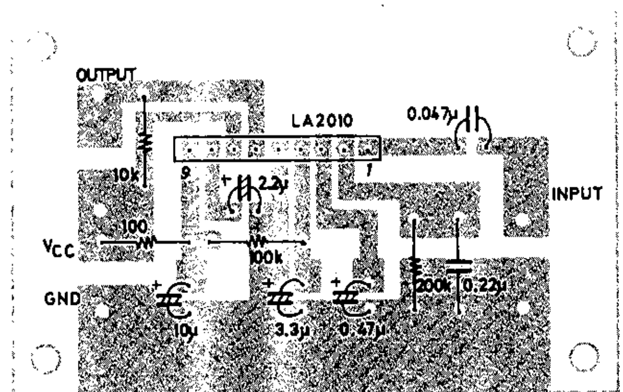
Equivalent Circuit Block Diagram



Sample Application Circuit

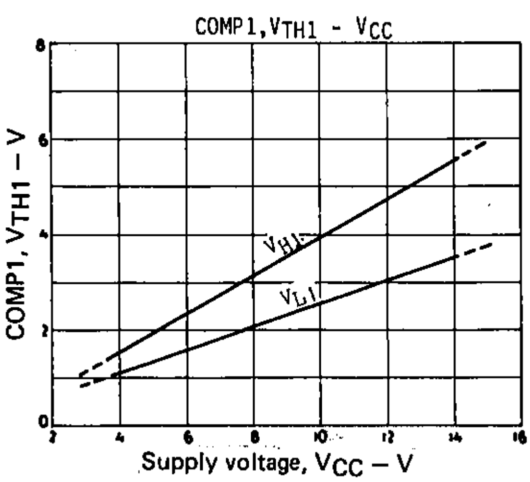


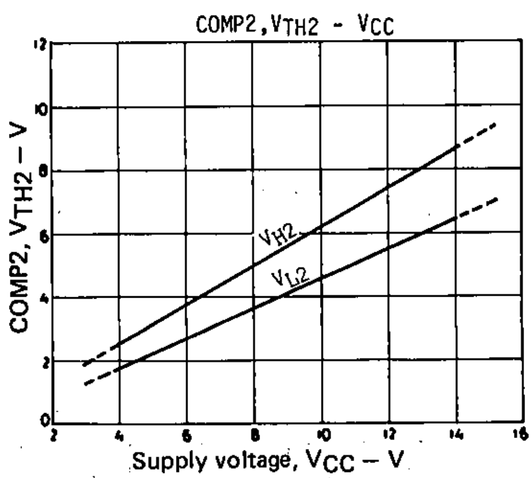
Unit (resistance: Ω, capacitance: F)



Sample Printed Circuit Pattern
(Cu-foiled area)

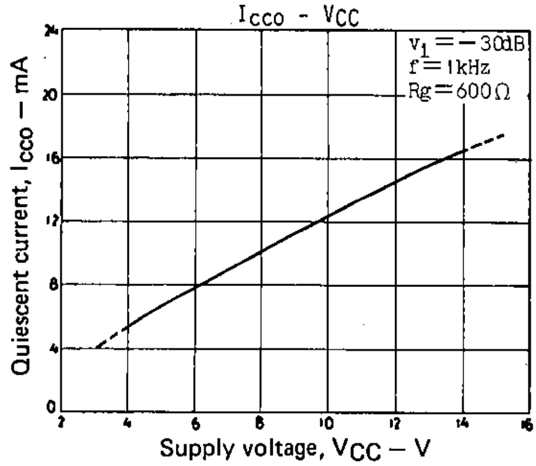
$66 \times 37\,mm^2$



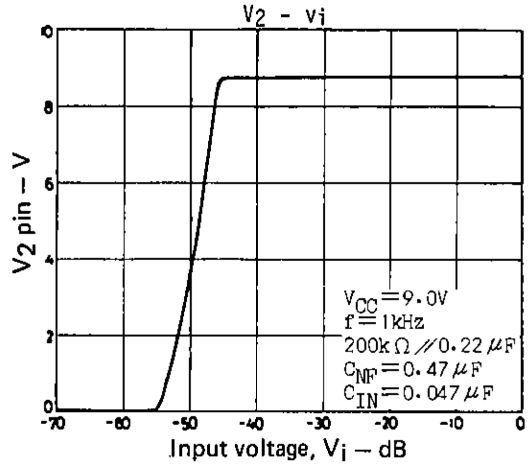


Unit (resistance: Ω, capacitance: F)

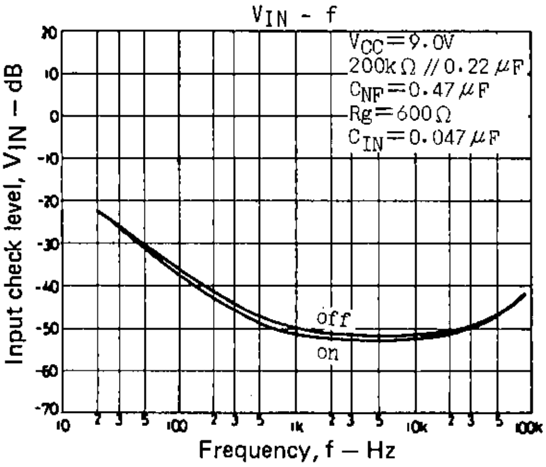
Icco - VCC



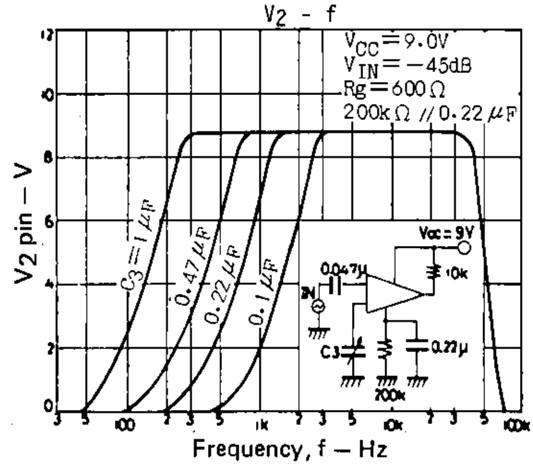
V2 - vi



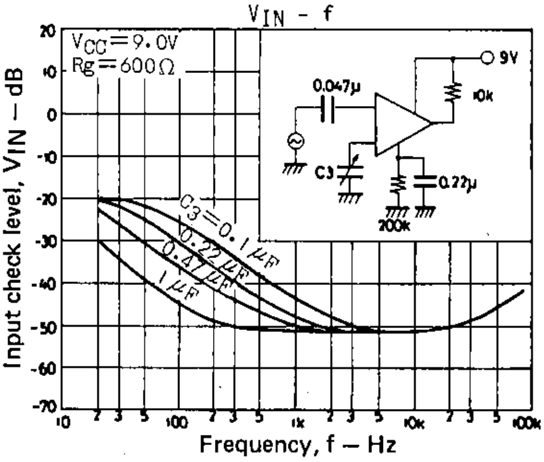
VIN - f



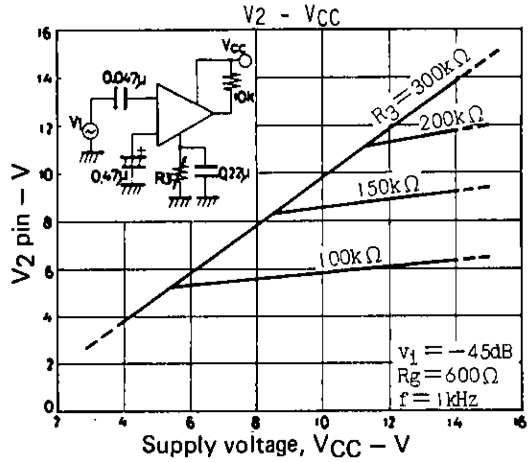
V2 - f



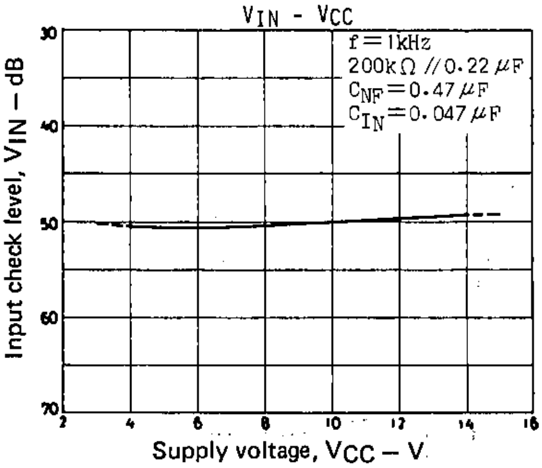
VIN - f



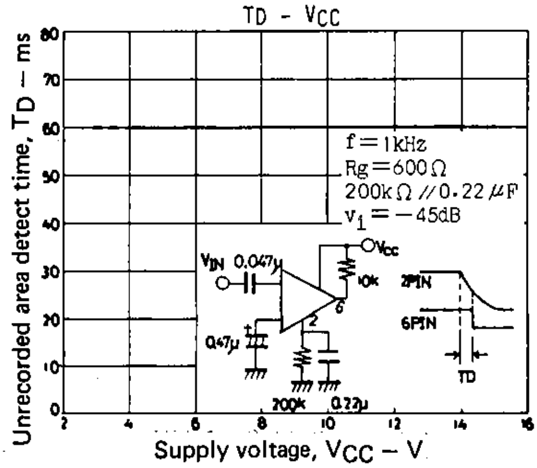
V2 - VCC



VIN - VCC



TD - VCC



Unit (resistance: Ω, capacitance: F)

